

Urban Forest Health Monitoring

Indiana Stage 1 Pilot Study

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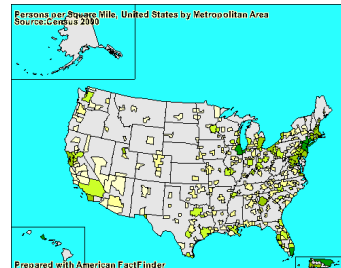
Introduction

The implementation of the Forest Health Monitoring (FHM) Program by the USDA Forest Service has proven effective as a sampling method to assess and detect potential health issues within rural forested areas. Currently, a national field survey to monitor urban forest resources on public and private U.S. lands does not exist. As a natural resource, the contributions of urban forests are becoming increasingly vital as landscapes become fragmented by urban sprawl and development. Indiana was selected to conduct a pilot study incorporating the FHM design within urban boundaries. This poster presents information on the UFHM pilot project.

Data Classes

(Persons/Mile²)

- 5 - 166
- 168 - 341
- 350 - 626
- 668 - 1043
- 1230 - 2029



2000 U.S. Census Map of persons/mi²

Objectives

The purpose of pilot is to refine sampling techniques, data collection procedures, determine validity of data and address complications encountered when utilizing the FHM sample framework in urban environments. Steps of the pilot are:

- Overlay of census defined urban areas
- Select plots falling within urban areas
- Identify non-forest plots
- Modify and document Core Field Guide
- Field crew training
- Plot data collection
- Analysis



Methods

The UFHM pilot project used FHM collection procedures and design as guidelines to establish each plot. The methods were modified by NOT collecting data for the FHM indicators – soils, downed woody debris, and vegetation. Micro-plots were not incorporated into the urban plot design.

Data not collected by FHM, but added for this pilot project included subplot variables to quantify percent buildings, impermeable/permeable surface and herbaceous plants. UFHM also recorded all trees $\geq 1"$ diameter whereas FHM surveys $\geq 5"$ diameter trees.

Sampling methods for measuring crowns and damages were collected following FHM protocol. Foliage absent was added to the FHM crown variables of crown density, foliage transparency, dieback and uncompact live crown ratio. Urban damage agents were added to capture human impacts on urban trees.

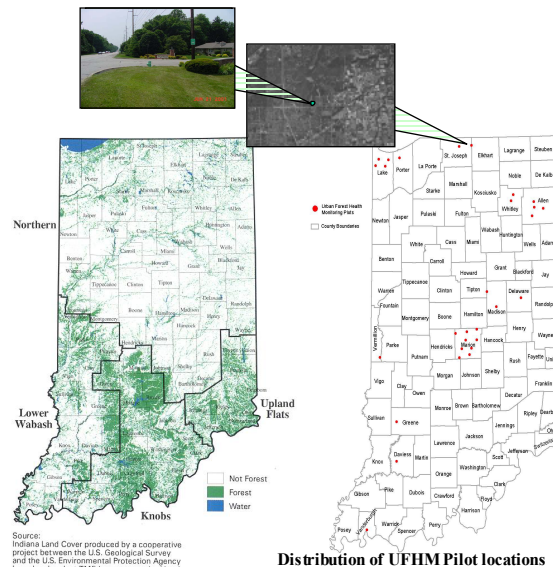
An expansion of UFHM included proximity of trees to buildings to help generate an energy model.

Using Forest Inventory and Analysis (FIA) survey points and the urban areas as defined by the U.S. census, 30, phase 2 FIA plots (1 of 5 panels) were identified and used to conduct the UFHM pilot project. Plots locations were distributed across 13 counties within 22 cities. Each plot contains four 1/24 acre subplots.

Plot installation initiated with the determination of the center location of the subplot 1 using fixed definable references from scaled aerial photos. Landowner permissions for property access were granted through personal contacts.

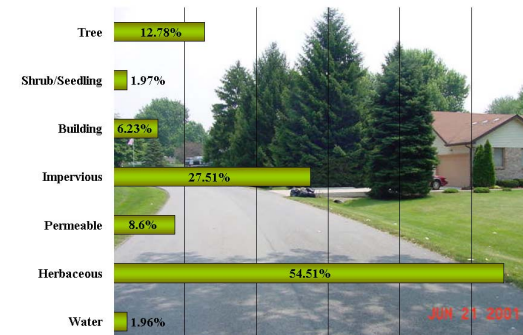
Initial data collection occurred during the leaf-on window (June to September) 2001. Plots were resurveyed in 2002 (leaf-on window) to incorporate changes and refinements.

Datasheets were created and sampling was conducted in the field by a single two person crew. Data was then transferred to a database designed for this UFHM pilot project.

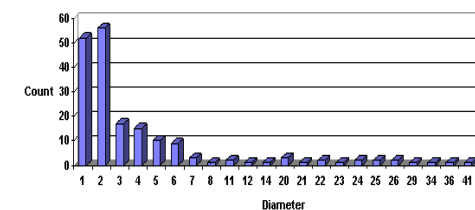


Distribution of UFHM Pilot locations

Average % Subplot Cover



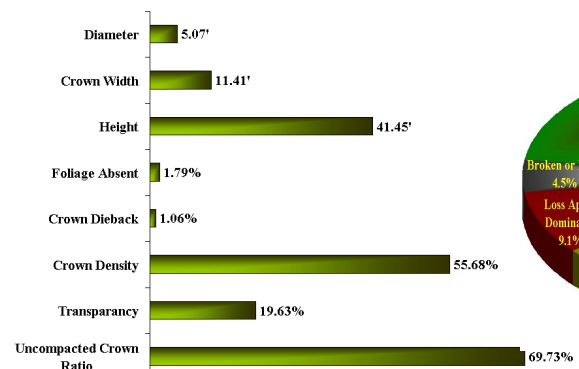
Diameter Distribution



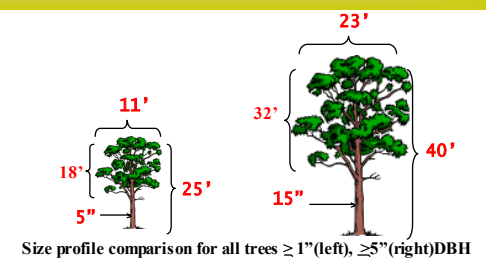
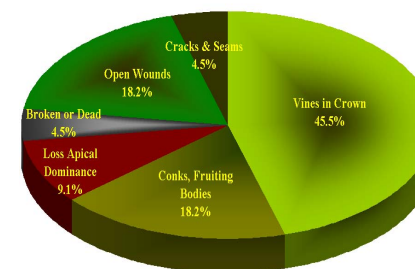
Results

- Plots landed in a variety of industrial areas, subdivisions, agriculture fields, parks, buildings/objects...
- There was an average of 1.93 landowner contacts/plot(not including repeated attempts)
- Estimated duration of single plot completion = 1plot/day/crew
- 55.6% of the installed plots contained 1 or more trees [average # trees/plot=12.73, ↑ variability(SD=20.01)]
- A total of 190 trees were surveyed(26 species), many were small saplings in vacant unmanaged lots
- The average DBH = 5.07" while average height = 11.41'
- Adding $\geq 1"$ DBH trees (2-3fold ↓ in avg. physical dimensions and ↑ # of trees sampled by 77.89%)
- Majority of land ownership was categorized as private (72.55%) and residential (29.41%)
- 10.52% of the trees surveyed were coded for one or more damage(s)
- Ground cover was mostly herbaceous (54.51%) and Impervious(27.51%)
- 19.47% of the trees recorded were located within 60' of one or more buildings
- Database (Microsoft Access®) was developed and useful for organization /analysis of data

Average Crown and Diameter Measurements

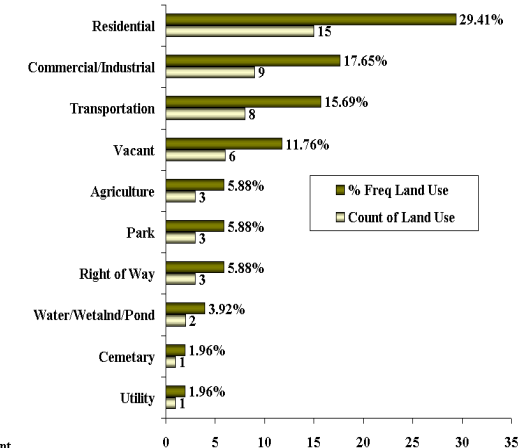


Damage Types

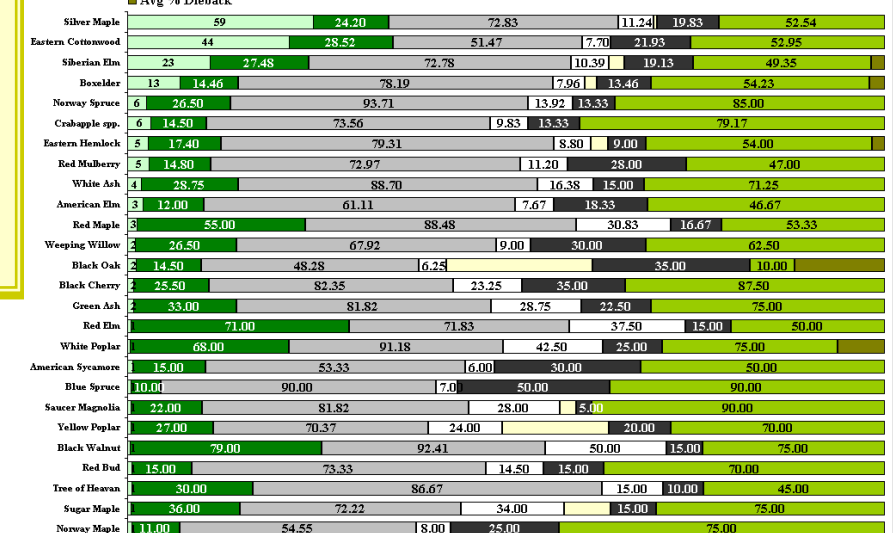


Size profile comparison for all trees $\geq 1"$ (left), $\geq 5"$ (right)DBH

Average Land Use



Species Profile



Averages of crown and size data by species for initial profile

Discussion

This study refined sampling methods and variables to demonstrate the feasibility of implementing FHM design in urban environments. Since all areas within urban boundaries are eligible for sampling, UFHM may provide the most accurate representation of urban forests. As more plots are sampled, profiles for various species in different urban scenarios can be generated to assess the health status of urban forests to improve management strategies. UFHM may also provide an early detection method to identify key pathogens. Although data collected from this study is not substantial enough to establish valid trends, it can demonstrate potential use. There are some concerns to address regarding liability and safety for field crews. Risk tree assessment and abatement options/policy should be established. Sampling in urban areas increases the probability of having multiple landowners/plot which offers greater potential for denied plot access and loss of temporal data. Handheld computers with a UFHM program should be developed for field sampling. As more plots are surveyed, statistically merged urban and rural data will provide a more holistic assessment of U.S. forest resources

